

CLAIMS

What is claimed is:

1. An interface component for a positioning system, comprising:

a positioning arm having a first end and a second end, the first end being positionable against an object to be positioned and the second end being attachable to an actuator arm of the positioning system; and

a damping element operably connected in parallel with the positioning arm.
2. The interface component of claim 1, wherein the first end of positioning arm includes a rigid contact surface, wherein the rigid contact surface may be positionable against the object to be positioned.
3. The interface component of claim 1, wherein the positioning arm extends at least partially through the damping element.
4. The interface component of claim 3, wherein the positioning arm is a cylindrical pin.
5. The interface component of claim 4, wherein the damping element is cylindrically shaped with a bore therethrough, and wherein the positioning arm passes through the bore in the damping element.
6. The interface component of claim 5, wherein a spring rate of the positioning arm is selectable by alteration of the radius of the pin.
7. The interface component of claim 6, wherein a spring rate of the positioning arm is selectable by alteration of the length of the pin.
8. The interface component of claim 3, wherein the damping element is laminated to the positioning arm.
9. The interface component of claim 1, wherein the damping element is made from an elastomeric material.

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10. The interface component of claim 9, wherein the damping element is molded.
11. The interface component of claim 2, wherein the positioning arm and the rigid contact surface are made from steel.
12. The interface component of claim 2, wherein the positioning arm and the rigid contact surface are made from a ceramic material.
13. The interface component of claim 2, wherein the positioning arm and the rigid contact surface are made from aluminum.
14. The interface component of claim 1, further comprising a support structure having a cup section and a base region with a bore therein, wherein the support structure is attachable to the actuator arm and the second end of the positioning arm is attached in the bore of the support structure, and wherein the damping element is mounted within the cup section of the support structure.
15. An interface component for a positioning system, comprising:
 - a support structure having a cup section and a base region with a bore therein;
 - a positioning arm having a first end, a second end, and defining a generally central longitudinal axis, the second end extending at least partially into the bore in the base region of the support structure; and
 - a damping element mounted within the cup section of the support structure, the damping element at least partially surrounding the positioning arm such that the first end of the positioning arm extends longitudinally beyond the damping element and beyond the cup section of the support structure.
16. An interface component for a positioning system, comprising:
 - a positioning arm having a first end and a second end, the first end having a rigid surface for contacting an object to be positioned and the second end being attachable to a positioning component of the positioning system; and

a damping element having a bore, the positioning arm being operably connected to the damping element and extending through the bore, the first end of the positioning arm extending beyond the damping element.

17. The interface component of claim 16, wherein the damping element is operably connected in parallel with the positioning arm.

18. The interface component of claim 16, wherein the rigid surface and the positioning arm are of unitary construction.

19. The interface component of claim 16, further comprising a support structure having a cup section and a base region with a support bore therein, wherein the support structure is attachable to the positioning component and the second end of the positioning arm is attached in the support bore of the support structure, and wherein the damping element is mounted within the cup section of the support structure.

20. An interface component for a positioning system, comprising:

means for positioning an object, wherein the means for positioning includes a first end and a second end, the first end being positionable against the object and the second end being attachable to a positioning component of the positioning system; and

a damping element operably connected in parallel with the positioning arm.

21. The interface component of claim 20, further comprising a support structure, wherein the second end of the means for positioning is attached to the support structure and the support structure is attachable to the positioning component, and wherein the damping element is supported by the support structure.

22. An interface component for a positioning system, comprising:

a support structure having an end that is attachable to a positioning component of the positioning system;

a positioning arm having a rigid surface at a first end for contacting an object to be

positioned and a second end attached to the support structure; and

a damping element operably connected in parallel with the positioning arm, wherein the damping element is mounted in the support structure.

23. The interface component of claim 22, wherein the damping element at least partially surrounds the positioning arm.

24. The interface component of claim 23, wherein the rigid surface is not surrounded by the damping element.

25. An interface component for a positioning system, comprising:

a support structure having an end that is attachable to a positioning component of the positioning system;

a positioning arm having a first end and a second end, the first end having a rigid surface for contacting an object to be positioned and the second end being attached to the support structure; and

a damping element at least partially surrounding the positioning arm such that the first end of the positioning arm extends beyond the damping element, wherein the damping element is mounted in the support structure.

26. A method for damping in a positioning system, comprising:

positioning a first end of a positioning arm against a positioned component of the positioning system;

affixing a second end of the positioning arm to a positioning component of the positioning system; and

attaching a damping element in parallel with a positioning arm between the positioned component and the positioning component.

27. A method for designing an interface component for use in a system between a

positioned component and a positioning component, the method comprising:

determining mechanical properties of the system independent of the interface component;

determining an effective interconnecting spring constant for the system using a desired frequency of operation; and

calculating an effective spring constant for the interface component using the effective interconnecting spring constant and the mechanical properties of the system.

28. The method of claim 27, wherein the mechanical properties include an effective spring constant of the system independent from the interface component.

29. The method of claim 27, wherein the mechanical properties include a range of inertia values for components of the system.

30. The method of claim 27, wherein the act of determining mechanical properties comprises using a stiff interface component relative to other components of the system.

31. The method of claim 27, wherein the act of determining mechanical properties includes using a bode response plot of the system performance.

32. The method of claim 31, wherein the act of determining mechanical properties further includes measuring a modal frequency of operation from the bode response plot.

33. The method of claim 32, wherein the act of determining mechanical properties further comprises using the modal frequency of operation to determine an effective spring constant of the system independent from the interface component.

34. The method of claim 27, further comprising designing the features of the interface component using the effective spring constant for the interface component.

35. The method of claim 34, wherein the features of the interface component include a length, radius, and material.

36. The method of claim 27, wherein the act of determining an effective interconnecting spring constant for the system comprises using a mathematical model of the system.

37. The method of claim 27, further comprising:

constructing an interface component having the effective spring constant for the interface component;

measuring a mechanical response of the system using the constructed interface component; and

repeating the above acts to design the interface component.

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